

# A2CC Q1 T3 Review Key

$$1) \frac{\cancel{x}(\cancel{x-3})}{2x^2+x-6} \cdot \frac{(\cancel{x+2})(\cancel{x-2})}{x^2-5x+6} = \boxed{\frac{x}{2x-3}}$$

$$\frac{2x^2+4x-3x-6}{(x-3)(x+2)} \cdot \frac{(x+2)(x-2)}{(x-3)(x-2)}$$

$$\frac{2x(x+2)-3(x+2)}{(2x-3)(x+2)}$$

Restrictions:

$$x \neq \frac{3}{2}, -2, 3, 2$$

$$2) \frac{\cancel{(x+3)}(\cancel{x-3})}{x^2-9} \cdot \frac{-1}{\cancel{x}(5-\cancel{x})} \cdot \frac{(\cancel{x-4})(\cancel{x-4})}{x^2-8x+16} = \frac{-1(x-3)}{1}$$

$$\frac{x^2-5x}{x(\cancel{x-5})} \cdot \frac{5x-x^2}{(\cancel{x-4})(x+3)} \cdot \frac{x^2-8x+16}{x-4}$$

$$\boxed{-x+3}$$

Restrictions:  $x \neq 0, 5, 4, -3$

$$3) \frac{(2)\cancel{x-7}}{(2)6} - \frac{3x-2}{12}$$

LCD: 12

$$\frac{2x-14}{12} + \frac{-3x+2}{12} = \boxed{\frac{-x-12}{12}}$$

\* No restrictions because there is no variables in any denominators

$$4) \frac{(\cancel{x})2}{(\cancel{x})x+3} + \frac{1}{x} \cdot \frac{(x+3)}{(x+3)}$$

LCD:  $x(x+3)$

$$\frac{2x}{x(x+3)} + \frac{x+3}{x(x+3)} = \boxed{\frac{3x+3}{x(x+3)}}$$

$x \neq 0, -3$

$$5) \frac{(\cancel{x+2})3}{(\cancel{x+2})x-2} + \frac{4}{(\cancel{x+2})(x-2)}$$

LCD:  $(x-2)(x+2)$

$$\frac{3x+6}{(x+2)(x-2)} + \frac{4}{(x+2)(x-2)} = \boxed{\frac{3x+10}{(x+2)(x-2)}}$$

$x \neq 2, -2$

$$6) \frac{3}{x^2-4} - \frac{2}{2-x} = \frac{3}{(x+2)(x-2)} - \frac{-2}{(x-2)(x+2)}$$

LCD:  
 $(x+2)(x-2)$   
 $x \neq -2, 2$

$$\frac{3}{(x+2)(x-2)} + \frac{+2x+4}{(x-2)(x+2)} = \boxed{\frac{2x+7}{(x+2)(x-2)}}$$

$$7) \frac{(x-y)x-y}{(x-y)x+y} - \frac{x+y}{x-y} \frac{(x+y)}{(x+y)} = \frac{x^2-2xy+y^2}{(x-y)(x+y)} - \frac{x^2+2xy+y^2}{(x-y)(x+y)} = \boxed{\frac{-4xy}{(x-y)(x+y)}}$$

LCD:  
 $(x+y)(x-y)$   
 $x \neq y$   
 $x \neq -y$

$$8) \frac{\cancel{(3y+5)}(y+2)}{3y(y+2)5(y+2)} \cdot \frac{(1+5y)(1-5y)}{3y^2-4y-10} = \boxed{\frac{1-5y}{y-2}}$$

Restrictions:  
 $y \neq -2, 2, \frac{-1}{5}, \frac{-5}{3}, \frac{1}{5}$

$\frac{3y^2+6y+5y+10}{3y^2+11y+10}$   
 $\frac{5y^2+10y+1y+2}{5y^2+11y+2}$   
 $\frac{5y(y+2)+1(y+2)}{(5y+1)(y+2)}$

$\frac{1-25y^2}{3y^2-4y-10}$   
 $\frac{3y^2-6y+5y-10}{3y(y-2)5(y-2)}$   
 $\frac{(3y+5)(y-2)}{(3y+5)(y-2)}$

$$9) \frac{3x^2-12}{3(x^2-4)} = \boxed{\frac{3(x-2)(x+2)}{3(x-2)(x+2)}}$$

$$10) 27y^3-64 \text{ (SOAP)}$$

$$(3y-4)((3y)^2+3y(4)+4^2)$$

$$\boxed{(3y-4)(9y^2+12y+16)}$$

$$11) \frac{x^3-x^2-6x}{x(x^2-x-6)} = \boxed{\frac{x(x-3)(x+2)}{x(x-3)(x+2)}}$$

$$12) 4x^2-6x-4$$

$$2(2x^2-3x-2)$$

$$2(2x^2-4x+1x-2)$$

$$2(2x(x-2)+1(x-2))$$

$$\boxed{2(2x+1)(x-2)}$$

$$13) 5a^2+14a-3$$

$$5a^2+15a-1a-3$$

$$5a(a+3)-1(a+3)$$

$$\boxed{(a+3)(5a-1)}$$

$$14) a^3-2a^2+a-2$$

$$a^2(a-2)+1(a-2)$$

$$\boxed{(a-2)(a^2+1)}$$



$$15) \begin{array}{l} x^2 + ax + bx + ab \\ x(x+a) \quad | \quad b(x+a) \\ \hline (x+b)(x+a) \end{array}$$

$$16) \begin{array}{l} x\sqrt{3} + \sqrt{75x^2} \\ \quad \quad \quad \sqrt{25x^2} \sqrt{3} \\ x\sqrt{3} + 5x\sqrt{3} \\ \hline 6x\sqrt{3} \end{array}$$

$$17) \begin{array}{l} 5\sqrt{-27} - \sqrt{-108} - 3\sqrt{-75} \\ 5i\sqrt{27} - i\sqrt{108} - 3i\sqrt{75} \\ \quad \quad \quad \sqrt{9}\sqrt{3} \quad \quad \sqrt{36}\sqrt{3} \quad \quad \sqrt{25}\sqrt{3} \\ 5i \cdot 3\sqrt{3} \quad i \cdot 6\sqrt{3} \quad 3i \cdot 5\sqrt{3} \\ 15i\sqrt{3} - 6i\sqrt{3} - 15i\sqrt{3} \\ \hline -6i\sqrt{3} \end{array}$$

$$18) \frac{2}{3-\sqrt{2}} \cdot \frac{3+\sqrt{2}}{3+\sqrt{2}} = \frac{6+2\sqrt{2}}{9-2} = \boxed{\frac{6+2\sqrt{2}}{7}}$$

$$19) \frac{5x^2-15x}{27x-3x^3} = \frac{5x(x-3)}{3x(9-x^2)} = \frac{5x \overset{-1}{(x-3)}}{3x(3-x)(3+x)} = \boxed{\frac{-5}{3(3+x)}}$$

$x \neq 0, 3, -3$

$$20) \quad a) \quad \frac{5}{3-x} \quad \begin{array}{l} 3-x \neq 0 \\ \quad \quad \quad +x \quad +x \\ \hline 3 \neq x \end{array}$$

$$b) \quad \frac{10}{x^2-25} \quad \begin{array}{l} x^2-25 \neq 0 \\ (x+5)(x-5) \neq 0 \\ \hline x \neq -5 \quad x \neq 5 \end{array}$$

$$c) \quad \frac{x^2-49}{2x^2-3x} \quad \begin{array}{l} 2x^2-3x \neq 0 \\ x(2x-3) \neq 0 \\ \quad \quad \quad x \neq 0 \quad 2x-3 \neq 0 \\ \quad \quad \quad 2x \neq 3 \\ \quad \quad \quad x \neq \frac{3}{2} \end{array}$$

$$d) \quad \frac{x^2-x-2}{x^3+x^2-2x} \quad \begin{array}{l} x^3+x^2-2x \neq 0 \\ x(x^2+x-2) \neq 0 \\ x(x+2)(x-1) \neq 0 \\ \quad \quad \quad x \neq 0 \quad x \neq -2 \quad x \neq 1 \end{array}$$

$$21) \frac{19}{x+7} + \frac{2}{7+x} = \frac{21}{x+7}$$

$x \neq -7$

$$22) \begin{array}{r} x - \sqrt{9-2x} = 3 \\ -x \quad -x \\ \hline -\sqrt{9-2x} = 3-x \\ -1 \quad -1 \\ \hline (\sqrt{9-2x})^2 = (x-3)^2 \end{array}$$

$$\begin{array}{r} 9-2x = x^2-6x+9 \\ -9+2x \quad +2x-9 \\ \hline 0 = x^2-4x \end{array}$$

$$0 = x(x-4)$$

$$0 = x(x-4)$$

$$\cancel{x=0} \quad \boxed{x=4}$$

reject

$$23) \begin{array}{r} \sqrt{2x+1} - 1 = 4 \\ +1 \quad +1 \\ \hline \end{array}$$

$$(\sqrt{2x+1})^2 = (5)^2$$

$$\begin{array}{r} 2x+1 = 25 \\ -1 \quad -1 \\ \hline \end{array}$$

$$\frac{2x}{2} = \frac{24}{2}$$

$$\boxed{x=12}$$

$$25) (4-5i)(2+i)$$

$$(*) i^2 = -1$$

$$8+4i-10i-5i^2$$

$$8-6i-5(-1)$$

$$8-6i+5$$

$$\boxed{13-6i}$$

$$24) \begin{array}{r} -i^{50} + i^{51} \\ 4\sqrt[12.5]{50} \quad -(-1) + (-i) \\ \hline \end{array}$$

$$4\sqrt[12.75]{51}$$

$$\boxed{1-i}$$

$$26) \begin{array}{r} 2^{x+1} = 16 \end{array}$$

$$2^{x+1} = 2^4$$

$$\begin{array}{r} x+1 = 4 \\ -1 \quad -1 \\ \hline \end{array}$$

$$\boxed{x=3}$$

$$27) \left(\frac{1}{3}\right)^{x+1} = 27$$

$$\left(3^{-1}\right)^{x+1} = 3^3$$

$$\begin{array}{r} -x-1 = 3 \\ +1 \quad +1 \\ \hline \end{array}$$

$$-x=4$$

$$\boxed{x=-4}$$

$$28) \begin{array}{r} 2x^{\frac{2}{3}} + 4 = 22 \\ -4 \quad -4 \\ \hline \end{array}$$

$$\frac{2x^{\frac{2}{3}}}{2} = \frac{18}{2}$$

$$\left(x^{\frac{2}{3}}\right)^{\frac{3}{2}} = 9^{\frac{3}{2}}$$

$$\boxed{x = \pm 27}$$

$$29) \frac{2\sqrt{2x+3}}{-x} + \frac{x}{-x} = 1$$

$$(2\sqrt{2x+3})^2 = (1-x)^2$$

$$4(2x+3) = 1 - 2x + x^2$$

$$\frac{8x+12}{-8x-12} = \frac{1-2x+x^2}{-12-8x}$$

$$0 = -11 - 10x + x^2$$

$$0 = x^2 - 10x - 11$$

$$(x-11)(x+1)$$

$$\cancel{x=11} \quad \boxed{x=-1}$$

reject

$$30) \frac{\sqrt{x-1}}{-x} + \frac{x}{-x} = 7$$

$$(\sqrt{x-1})^2 = (7-x)^2$$

$$\frac{x-1}{-x+1} = \frac{49-14x+x^2}{+1-x}$$

$$0 = x^2 - 15x + 50$$

$$(x-5)(x-10)$$

$$\boxed{x=5} \quad \cancel{x=10} \text{ reject}$$

31)

$$\frac{(x^2y^2)\frac{1}{x^2}}{x^2y^2} - \frac{1}{y^2} \frac{(x^2y^2)}{x^2}$$

$$\frac{(x^2y^2)\frac{1}{x^2} + \frac{1}{x} \frac{(x^2y^2)}{x}}{x^2y + xy^2}$$

$$= \frac{y^2 - x^2}{x^2y + xy^2}$$

$$= \frac{(y-x)(y+x)}{xy(x+y)}$$

$$= \boxed{\frac{y-x}{xy}}$$

$$\text{LCD: } \frac{x^2y^2}{x^2y^2}$$

$$x \neq 0$$

$$y \neq 0$$

$$x \neq -y$$

32)

$$\text{LCD: } x+2$$

$$x \neq -2$$

$$\frac{\frac{x}{x+2} \frac{(x+2)}{x+2}}{(x+2)\frac{1}{1} - \frac{x}{x+2} \frac{(x+2)}{x+2}}$$

$$= \frac{x}{x+2-x} = \boxed{\frac{x}{2}}$$



$$33) \frac{3x^{-1} - \frac{x}{3}}{3^{-1} + x^{-1}} = \frac{\cancel{(3x)} \frac{3}{\cancel{x}} - \frac{x}{3} \cancel{(3x)}}{\cancel{(3x)} \frac{1}{3} + \frac{1}{\cancel{x}} \cancel{(3x)}}$$

$$\begin{array}{l} \text{LCD} = 3x \quad x \neq 0 \\ x \neq -3 \\ \frac{9 - x^2}{x + 3} = \frac{(3-x)(3+x)}{(x+3)} \\ = \boxed{3-x} \end{array}$$

$$34) (6x^6y^2)^2 \left( \frac{xy^2}{2} \right) = 36x^{12}y^4 \cdot \frac{xy^2}{2} = \frac{36x^{13}y^6}{2} = \boxed{18x^{13}y^6}$$

$$35) (r^2s)^3 (3s)^{-2} (9r)^2 \\ (r^6s^3) \left( \frac{1}{(3s)^2} \right) (81r^2) = \frac{81r^8s^3}{9s^2} = \boxed{9r^8s}$$

$$36) \frac{a^4b^{-2}c}{a^{-5}b^5} = \boxed{\frac{a^9c}{b^7}}$$

$$37) 4a^{\frac{2}{3}} = \boxed{4\sqrt[3]{a^2}}$$

$$38) x^{-\frac{3}{4}} = \frac{1}{x^{\frac{3}{4}}} = \boxed{\frac{1}{\sqrt[4]{x^3}}}$$

$$39) (5y)^{\frac{3}{8}} = \boxed{\sqrt[8]{(5y)^3}}$$

$$40) \sqrt[3]{32x^7y^9z^2} \\ \sqrt[3]{8x^6y^9} \sqrt[3]{4xz^2} \\ \boxed{2x^2y^3 \sqrt[3]{4xz^2}}$$

$$41) \frac{6\sqrt{8x^3} - 9\sqrt{10x^5}}{3\sqrt{2x}}$$

$$\frac{6\sqrt{8x^3}}{3\sqrt{2x}} - \frac{9\sqrt{10x^5}}{3\sqrt{2x}}$$

$$2\sqrt{4x^2} - 3\sqrt{5x^4}$$

$$2(2x) - 3x^2\sqrt{5} = \boxed{4x - 3x^2\sqrt{5}}$$